



OQ PRODUCT HANDLING GUIDE

Trimethylolpropane, Molten CAS # 77-99-6

Molten Trimethylolpropane is a colorless, viscous, and odorless liquid. It is soluble in water. Trimethylolpropane is stable under recommended storage conditions. It may burn when exposed to an ignition source. Its melting point is 138°F (59°C)

Trimethylolpropane is available from OQ in the following packages:

- DOT 115A60W6 Tank Cars
- DOT MC 307 or DOT 407 Insulated Tank Trucks

Storage

Recommended Blanketing	Air ^{1,2} or Dry Nitrogen ^{1,2,3}
Recommended Temperature	
Maximum	220°F (104.4°C)
Minimum	170°F (76.7°C)
Recommended Pressure	Atmospheric
Bulk Quantities	Outside, detached tanks
Small Containers	Dry, well ventilated area

Handling

- Thoroughly review Safety Data Sheet before handling product.
- Keep containers closed when not in use.
- Open containers slowly to allow any excess pressure to vent.
- Keep away from heat, sparks, flame, or other sources of ignition.
- Protect small containers from physical damage.
- Use proper electrical grounding and bonding procedures when loading, unloading, and transferring.¹
- Refer to the OQ Safety Data Sheet for more information on materials to avoid.
- Use spark-resistant tools.
- Electrical equipment and circuits in all storage and handling areas must conform to requirements of national electrical code (Articles 500 and 501) for hazardous location.
- Trimethylolpropane is hygroscopic. To maintain product quality, avoid contact with undried air.

See the National Fire Protection Agency (NFPA) #30 "Flammable and Combustible Liquids Code" and consult with qualified fire protection specialists to determine specific storage tank design requirements. Refer to the OQ Safety Data Sheet for more specific health and environmental

information and refer to the OQ Product Descriptions for additional physical properties and general product information. Safety Data Sheet and Product Descriptions for Trimethylolpropane are available through your OQ sales representative.

1. Refer to NFPA #77 "Static Electricity" for proper electrical grounding procedures.
2. See the National Fire Protection Agency (NFPA) #30 "Flammable and Combustible Liquids Code" and consult with qualified fire protection specialists to determine specific storage tank design requirements.
3. Blanketing may be used to retain quality in long-term storage conditions.

This information is based on our present state of knowledge and shall be intended to provide general notes on our products and their field of application. It shall therefore not be construed as guaranteeing specific characteristics of the products described and/or their suitability for a particular application. Any existing industrial property rights shall be observed. The quality of our products is warranted under our General Conditions of Sale.

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This guide has been prepared to answer typical questions about the bulk handling of Molten Trimethylolpropane (TMP) and the design of transfer and storage facilities.

The information presented here is considered appropriate for normal handling and preliminary engineering. It must be stressed

that construction costs, facilities, general procedures and standards vary from organization to organization due to location, extent of personnel training, facilities, volume throughout, space and other factors. Therefore, determination of compatibility with existing systems of operation is entirely in the hands of the user.

Customers and prospective customers are welcome to take

advantage of the counseling services offered by OQ concerning safety, storage and handling aspects of bulk Trimethylolpropane. While we cannot assume responsibility for the proper conduct of another's operation, OQ data may prove of value. Requests for additional information may be made through your nearest OQ representative.

Bulk Handling System Benefits

OQ can supply large volume consumers with tank cars or tank trucks of Molten Trimethylolpropane. The transition from bags or other containers to bulk has numerous advantages, all of which should be assigned a dollar value in an economic evaluation. Some of them are as follows:

1. Elimination of labor costs involved with multiple handling.
2. Elimination of the expense of opening bags and the potential exposure to bag fragments in the finished product.
3. Elimination of the cost involved in maintaining warehouse areas.
4. Bulk shipments permit closed unloading systems, which minimize contamination, moisture pickup and waste.
5. Elimination of expense of bag or other container disposal.
6. Elimination of typical solids handling problems such as dust collection.

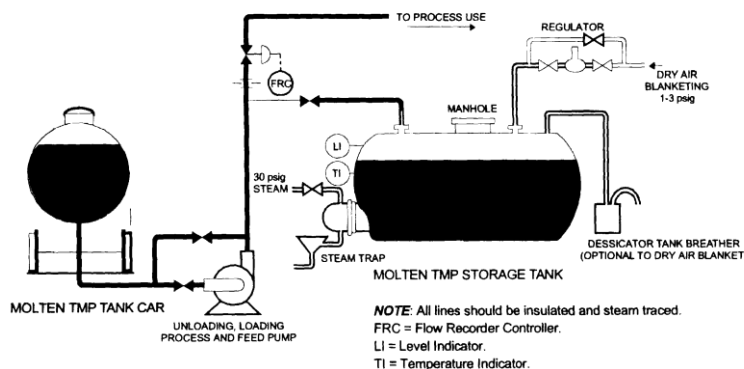
Bulk Molten Trimethylolpropane Receiving System

A typical storage and receiving installation is represented in the figure below. The system would consist of:

- a. Tank car or tank truck unloading spot.
- b. Transfer pump capable of transferring product to a storage tank.
- c. All lines heat traced and insulated (285°F maximum skin temperature).
- d. Insulated storage tank.
- e. Bayonet type heater capable of maintaining product temperature at 190°F with 285°F maximum skin temperature.

- f. Appropriate level and temperature measuring devices.
- g. Circulation and process feed pump.

Typical Unloading And Storage Installation



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Materials of Construction

Types 316 or 304 stainless steel, or phenolic lined carbon steel is acceptable as materials of construction for tanks and piping in molten TMP service. Fiber glass or reinforced polyester are not

acceptable. TMP will deteriorate in color when stored in plain carbon steel or aluminum.

Bulk Storage Tank

The tank containing molten should be heavily insulated to conserve heat and provide uniform temperature distribution. Jacketed tanks of the proper materials of construction

will suffice. The tank should be blanketed with dry nitrogen (preferable) or dry air to reduce the possibility of moisture contamination.

Unloading System

The pumps and control valves need to be designed to handle high viscosity material of 110 centipoise at 165°F with a density of 9.04 pound/gallon. All lines should be heat traced and insulated to prevent "freeze-up" at dead points. In design of pump and piping layout, attention should be directed towards the elimination of "dead-legs"

and low spots. When, and if, lines are drained, these locations will be the source of plugging. Pump and circulation schemes should be designed to avoid aeration of the molten TMP.

OQ's experience has shown TMP to be stable in a molten state at about 200°F for up to three months.

Our plant maintains a temperature of approximately 220°F-230°F in its molten tank. Solidification occurs at 140°F. For ease of transfer through pumps, pipes...etc., it is recommended that a temperature of 170°F-220°F be maintained in the customer's facility.

Tank Cars for Molten Trimethylolpropane

The tank cars used for molten TMP have been designed for high thermal performance. It is essentially a "tank within a tank," the two being separated by a urethane cellular plastic foam. This material is bonded to the inner and outer tank and uniformly supports the inner tank without the use of any metal connections.

Tank cars used for molten TMP can be heated. A stainless steel heating coil is available to thaw crystalline TMP.

Although the insulating capacity of the tank car should be adequate for normal transit times, abnormally long transit times in very severe winter conditions may cause some "freeze-up" of the lading. In such a

case, the heating coils can be used to return all the lading to a molten state.

These cars are not normally equipped for top unloading. Preferably, cars are unloaded through the bottom outlet nozzle. Dry air or dry nitrogen can be applied through the dome connection to provide the motive unloading pressure or to assist the unloading by centrifugal pump.

Tank Trucks for Molten Trimethylolpropane

OQ does ship molten TMP in tank trucks where it is advisable. The nearest OQ sales representative should be contacted for information on this mode of distribution.

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Materials of Construction for Storage and Transportation

Item	Recommended	Acceptable
Tank	Stainless Steel ¹	Lined Carbon Steel ²
Piping	Stainless Steel ¹	-
Valves	Stainless Steel ¹	-
Pumps	Stainless Steel ¹	-
Relief Valves	Stainless Steel ¹	-
Gaskets	Glass Filled PTFE ³	PTFE ³
Pump Seals	Single mechanical seal: Stainless steel/Hastelloy C-276 metallic components, Kalrez O- rings	-
Valve Packing	PTFE ³	Graphite
Pipe End Connections	Welded and flanged system	-
Heat Exchanger	Product Side: Stainless Steel 316	-
Hoses	Stainless Steel ¹	-
Tank Car	Stainless Steel ¹	-
Tank Truck	Stainless Steel ¹	-

1. Type 304 or 316 Stainless Steel.
2. Lining refers to high baked phenolic.
3. Polytetrafluoroethylene.

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